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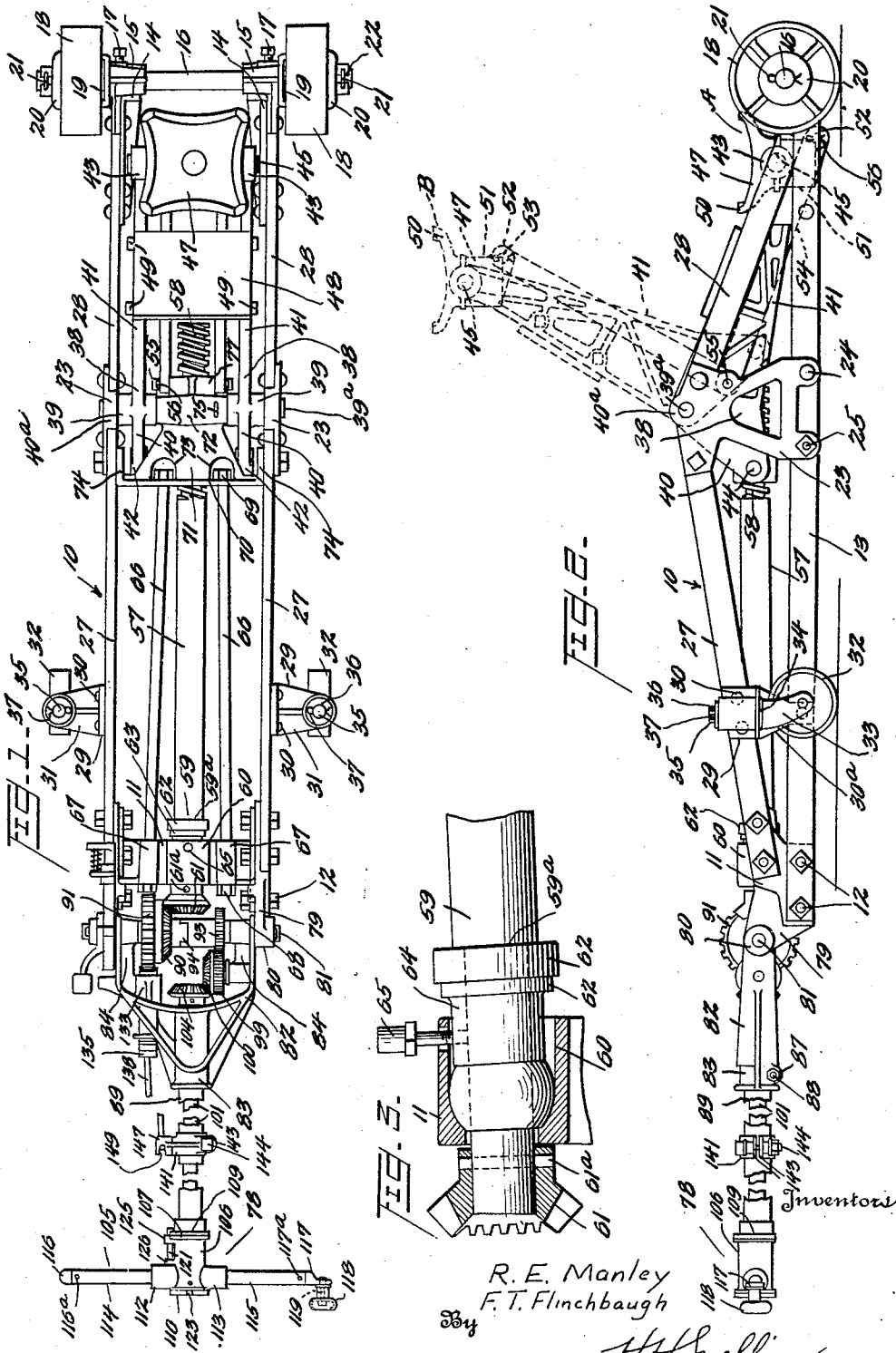
R. E. MANLEY ET AL

1,818,077

MECHANICAL JACK

Filed Dec. 3, 1928

3 Sheets-Sheet 1



Aug. 11, 1931.

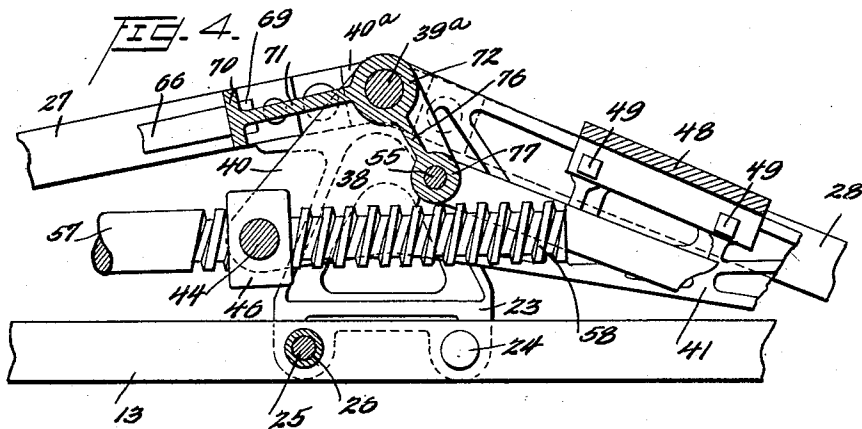
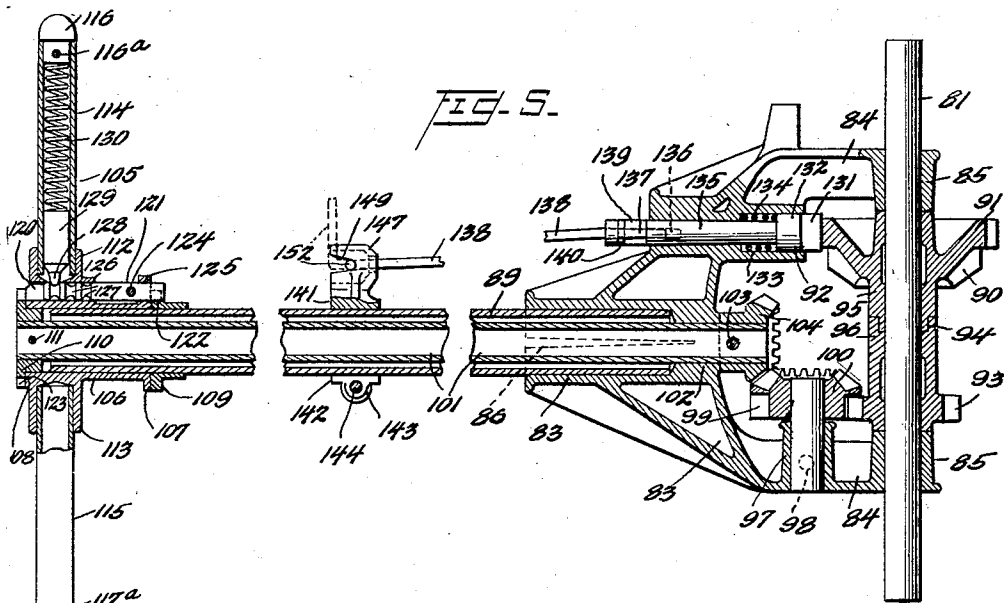
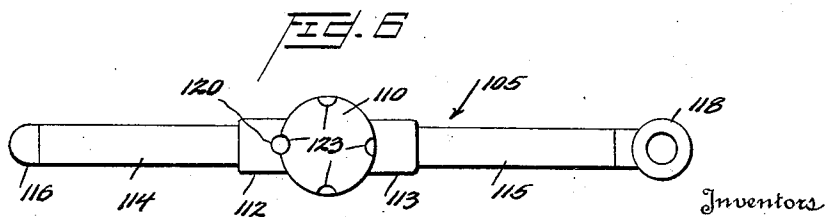
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MECHANICAL JACK

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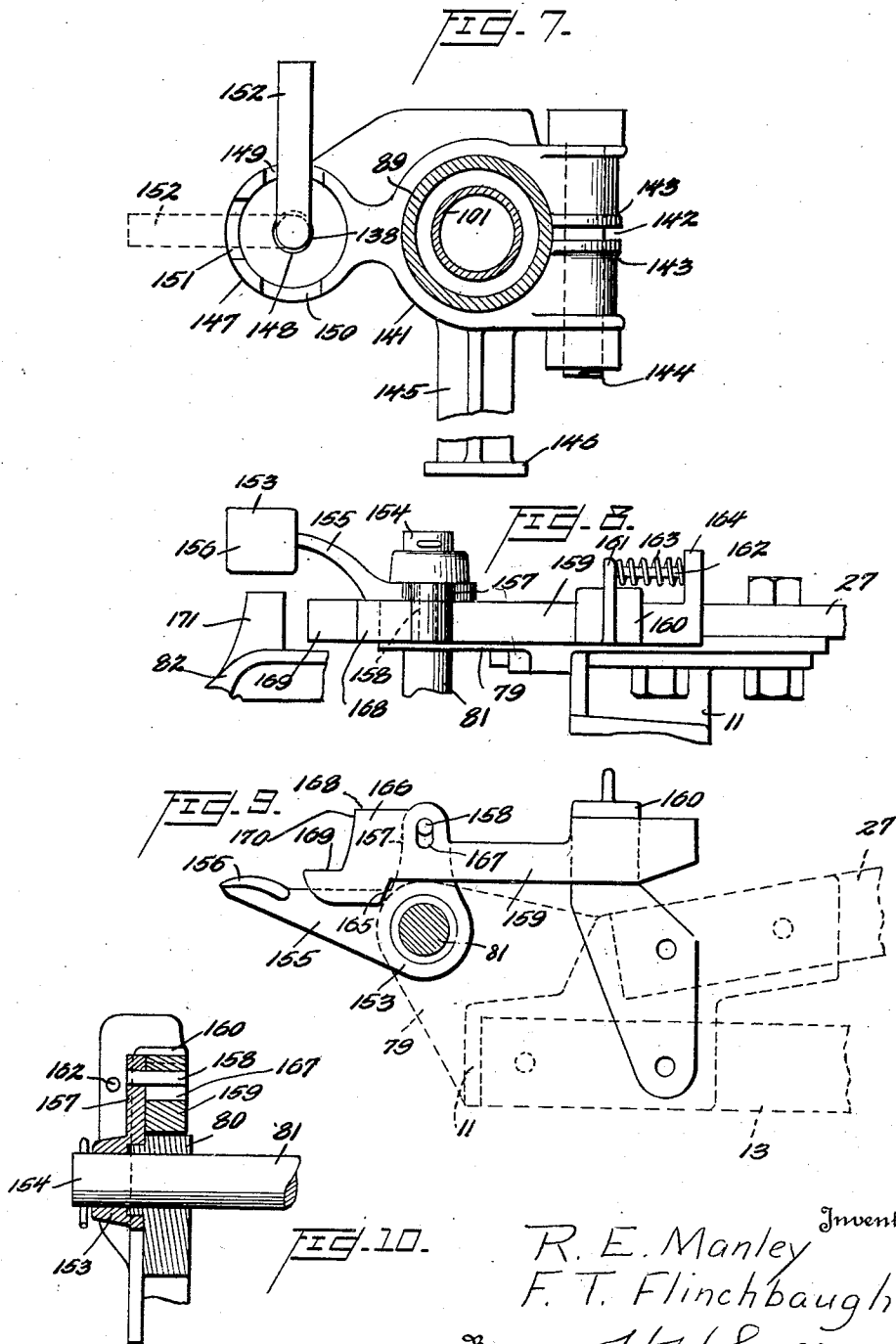
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MECHANICAL JACK

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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MECHANICAL JACK

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This invention relates to roller jacks for vehicles and more particularly to improvements in jacks primarily for use in garages for elevating axles of automobiles and for moving such automobiles by means thereof with either their front or rear axle elevated.

The main object of the invention is to provide a light but strong jack with operating devices which will facilitate the operation thereof.

The jack includes a truck comprising a wheeled rectangular frame constructed of standard bar members and special castings to which the bars are secured and so arranged as to provide a novel braced jack frame which is low, relatively light, and of rigid construction for carrying the jack lifting members as compared with the usual cast frame constructions.

The lifting member is raised and lowered by means of a long screw which is rotated so as to move a nut connected with the lifting member and according to this invention a two-speed operating means is provided to effect a rapid movement of the lifting member to a position for lifting a load or away therefrom and a slow movement with a high leverage of the lifting member under load either for raising or lowering the load. The present embodiment of the operating means includes an actuating and towing lever pivotally connected with the jack frame having a cross bar or handle which may be connected with the screw for rotating it rapidly, or the handle may be connected so as to permit the lever to be oscillated to actuate the operating means with a step by step movement for raising or lowering the lifting member when a load is resting thereon which could not be elevated by the turning movement of the cross bar. The cross bar on the lever provides operating means for actuating the lifting member and for towing the jack either with or without a load as well as for "spotting", that is, moving the jack so that its lifting means are properly positioned under the load to be raised.

In order to effect a quick spotting of the lifting member under the load the rollers on the front end of the jack frame are castor

wheels and the frame is provided with an adjustable slide adapted to be projected into the path of a pin carried by the lever; by swinging the handle and lever downwardly the pin carried by the lever engages the projected slide and further movement raises the rear end of the jack frame so that the jack can be quickly swung on its castors for spotting the lifting member under the load without having to reciprocate the jack back and forth until the desired position is obtained. The adjustable slide is preferably stepped to provide for different elevations of the lever for convenience of the operator and is provided with pedal means for projecting it outward and spring means for retracting it when the slide is relieved of the weight of the lever.

The accompanying drawings show a practical embodiment of the invention in which

Figure 1 is a plan view of a jack for vehicles in accordance with this invention;

Figure 2 is a side elevation thereof; and

Figure 3 is an enlarged detailed section thru the bearing showing in elevation the end portion of the screw.

Figure 4 is an enlarged side elevation partly in section of the load lifting means.

Figure 5 is an enlarged detail section of the actuating and towing lever mechanism.

Figure 6 is an end view of the handle.

Figure 7 is a transverse section thru the collar which surrounds the drive shaft.

Figure 8 is a detailed plan view of the spotter used for facilitating the positioning of the jack under a member to be lifted.

Figure 9 is a side elevation of the same.

Figure 10 is a transverse section of the jack positioning lever.

Referring to the drawings, the truck or main frame 10 of the jack comprises a transverse front end casting 11 the ends of which are suitably secured by means of machine bolts 12 to the front ends of side bars 13 which extend lengthwise to the rear end of the frame where a pair of castings 14 are secured to them. Castings 14 are each formed with a socket 15 for receiving a transverse axle 16 and each is provided with a set screw 17 for locking the castings in proper posi-

tion with respect to each other and the axle. The outer ends of axle 16 provide bearings upon which rollers 18 are journaled, the outer surfaces of castings 14 being formed to provide side thrust bearings 19 for the inner sides of the rollers, and similar side thrust bearings 20 are mounted on the axle for the outer sides of the rollers and are preferably secured in place by means of cotter pins 21 passing through bifurcations 22 in the outer portions of the bearings and apertures in the axle. In an intermediate position along the bars 13 are upwardly extending castings 23 secured to the bars 13 by means of rivets 24, a stud bolt 25 extending transversely of the frame, and by a pipe spacer 26 positioned between the two bars 15. Upper load supporting side bars 27 and 28 are connected with the upper portions of castings 23, front end casting 11 and rear end castings 14, respectively, extending longitudinally over the side bars 13. An outwardly extending bracket casting 29 is secured by means of rivets 30 to each of the bars 27 at positions substantially equal to the length of the bars 28 away from the castings 23 and a downward projection 30a of each casting 29 is also secured by a rivet to the corresponding underlying bar 13 so as to maintain the bracket in proper position with respect to the bars of the frame. The outward lateral projections 31 of the bracket castings 29 provide bearings for castor wheels 32 which are rotatably mounted in bifurcated supporting members 33 having bearings 34 engaging the under side of the projections 31 and vertical axles 35 projecting upwardly therethrough. Washers 36 are positioned on the upper and lower sides of projections 31 and cotter pins 37 are placed in apertures in the upper ends of axles 35 for securing the castor wheels to the frame.

It will be noted that the frame or truck consists of a number of relatively small castings,—11, 14, 23 and 29,—formed with the necessary reinforcing webs and securing lugs for connecting them with the frame bars 13, 27 and 28 which are relatively light steel members of standard construction whereby a light reenforced frame is provided as compared with a frame entirely of cast parts which would not only be considerably heavier but more expensive to construct. It will also be noted that by this construction that a greater portion of the load to be carried upon the upper portion of the intermediate castings 23 will be transmitted to the supporting rollers 18 and 32 through the upper bars 27 and 28 and as hereinafter set forth the castor rollers or wheels 32 adjacent to the front end of the frame provide means for quickly bringing the frame to a required position as well as affording means for turning the frame as it is drawn along on its rollers.

The load lifting means comprises a pair of levers 38 each having a hub 39 mounted on a shaft 39a extending transversely of the frame 10 and journaled in bearings 40a formed in the upper portions of castings 23 with the hubs 39 each being positioned adjacent to the inner sides of the castings 23. Each lever 38 consists of a down arm 40 for connection with operating mechanism and a lifting arm 41, cast integrally with their hub 39 in the form of a bell crank, the outer extremities of the arms 40 and 41 being formed with bearings 42 and 43 respectively for transverse axles 44 and 45. Axles 44 and 45 provide connections between the operating nut 46, from which axle members 44 extend, and the down arms 40 of the levers 38 and between the lifting arms 41 of levers 38 and the lifting head 47 which is supported by axle members 45. The two levers 38 have their lifting arms 41 connected by means of a tie plate 48 secured to them by means of bolts 49 so that the levers 38 are properly spaced and united as an integral lifting lever.

The lifting head 47 includes a load engaging cap 50 and a downwardly extending body portion 51 from which the axle members 45 extend, and through projections 52 at the lower rear extremity of the body portion 51 is a pivot rod 53. The normal upright position of the lifting head 47 is maintained by means of drag links 54 connected with the pivot rod 53 and a fixed pivot rod 55 so arranged that the drag links will have a parallel motion with respect to the lifting arms 41. Drag links are secured on the pivot rods 53 and 55 by means of cotter pins 56.

The operating means includes a long central screw 57, the threaded end portion 58 of which cooperatively engages the operating nut 46 for holding the lifting head at any desired elevation from the lowest to the highest positions as indicated at A and B respectively in Figure 2 of the drawings. The other end portion 59 of screw 57 extends through an apertured boss or bearing 60 of casting 11 and at its outer end is provided with a beveled gear 61 secured in place by means of a pin 61a. Portion 59 of the screw is of a reduced diameter forming a shoulder at 59a against which a thrust bearing 62 is seated; this may be a ball thrust bearing. A spacing washer 63 engages the other side of the thrust bearing and beyond that a sleeve member 64 is positioned on the screw. The outer end of sleeve 64 is spherically shaped to engage a complementary shaped portion on the casting 11 forming a bearing for this portion of the sleeve 64 whereby the sleeve may be rocked slightly with respect to the bearing as the screw is rotated and its threaded end is swung up or down in following the swinging position of nut 46 which is carried by the down arm 40 of the lifting lever. The portion of the aperture through boss 60 sur-

rounding the intermediate portion of sleeve 64 is of sufficient size to permit the slight rocking movement of the sleeve and the boss is provided with a lubricator at 65 to feed 5 lubricant into the aperture to prevent wear between the sleeve and its bearing and the end portion 59 of the screw turning within the sleeve.

In order to brace the frame 10 to counter- 10 act the effect of the load a pair of tension rods 66 are connected between casting 11 and shaft 40 in the upper portion of castings 23 upon which the lifting lever is journaled. These rods pass through apertured bosses 67 15 formed on the upper side of casting 11 and are provided with nuts 68 which engage the bosses. The opposite ends of rods 66 are provided with nuts 69 which engage a lateral flange 70 of a plate 71 extending from a 20 hub 72 mounted on shaft 39a between the two lever members 38. To apply a tension along the rods 66 the nuts 68 and 69 may be tightened; plate 71 is apertured at 73 so as to permit free access for manipulating nuts 25 69 during the assembly of adjustment of the equipment.

Plate 71 is preferably formed with end flanges 74 extending from the lateral flange 70 and these flanges 74 are secured to bars 30 27 which assure proper alinement and also afford additional bracing for the frame and maintaining the lateral spacing of the upper portion thereof. The hub 72 of this plate is preferably apertured and shaft 39a 35 is correspondingly apertured for receiving a cotter pin 75 which prevents the shaft from moving endwise or from turning. Plate 71 has a lug 76 extending downwardly from hub 72, the lower end 77 of lug 76 being 40 enlarged and apertured for receiving the pivot rod 55, heretofore referred to, and carrying it in a fixed position with respect to the lifting lever arms.

An actuating and towing lever with its 45 handle generally designated as 78 is secured to front casting 11 of the frame by means of lug plates 79 fastened to the casting between it and the bars 13 and 27 by means of the securing bolts 12 previously referred to. 50 The outer ends of lug plates 79 are provided with bearings 80 in which a lateral shaft 81 is journaled for pivotally connecting a casting 82 of the lever to the frame 10. Casting 82 has a forwardly extending socket 55 portion 83 and rearwardly extending arms 84 provided with bearings 85 through which shaft 81 passes to provide the pivotal connection between the lever and frame. The socket 83 is slotted at 86 and is provided 60 with apertured projections 87 through which a bolt 88 passes to provide clamping means for holding the end of a tubular extending member 89 of the lever in place therein.

65 Mounted between the arms 84 of casting 82

is a train of gears including a beveled gear 90 which meshes with gear 61 on the front end of the main screw 57 and is rotatably mounted on shaft 81. On the back of gear 90 is a toothed ratchet 70 wheel 91 which may cooperate with a pawl 92 in a manner hereinafter set forth and in front thereof is a second gear 93 of the gear train which is also rotatably 75 mounted on shaft 81 and drivingly connected with gear 90 by means of a tongue and slot connection 94 between the hubs 95 and 96 of these gears. The casting 82 is provided with a socket 97 in which a stub shaft is received and retained by means 80 of a set screw 98; on this shaft is mounted the third gear of the train, a combined spur gear 99 which meshes with spur gear 93 and a beveled gear 100. Extending through the tube 89 and socket 83 is a drive shaft 101 85 which is journaled adjacent to its lower end in a bearing 102 formed through casting 82 beyond the socket 83 and on its end is secured by means of a pin 103 the fourth or driving gear of the train, beveled gear 104 90 which meshes with beveled gear 100. It is to be noted that the rotation of the drive shaft 101 will effect a rapid rotation of the screw 57 by means of the gear train and consequently a fast movement of the operating 95 nut 46 for quickly raising or lowering the lifting head 47 to any required position.

A cross bar 105 constituting a handle for the lever is mounted on the front or outer end of the tube 89 and is actuatable for operating 100 the jack and for towing it. This cross bar or handle comprises a sleeve 106 which is flanged at each end as indicated at 107 and 108 and is rotatably mounted on the end of tube 89 with its flange 107 engaging a collar 109 brazed to tube 89 105 as a limiting abutment therefor. A flanged collar 110 secured to the drive shaft 101 by means of a pin 111 forms an abutment co-operating with the flange 108 at the other 110 end of the sleeve to maintain it in proper position on the end of the tube. Sleeve 106 is provided with laterally extending sockets 112 and 113 into which tubes 114 and 115 115 of the cross bar are respectively secured. In the outer end of tube 114 is a spherically ended retaining plug 116 which is secured in place by means of a pin or rivet 116a and in the outer end of the tube 115 is a plug 117 similarly fastened by a pin 117a. On 120 this plug 117 is a knob 118 rotatably mounted on a screw 119 which secures the knob to the plug as a means for rotating the cross bar or handle 105 for turning the drive shaft 101 in the manner to be explained as follows: 125

The sleeve 106 of the cross bar 105 has a longitudinal key-way 120 extending through its socket 112 and end flanges 107 and 108 in which a bolt or key member 121 is slidably 130 received. Key 121 is no longer than sleeve

106 but is adapted to be extended beyond either end of the sleeve; extending outwardly through the flange 107 it engages in a notch 122 in the collar 109 which prevents the cross bar from turning and holds it in a horizontal position with respect to tube 89; extending outwardly in the other direction it is adapted to engage in any one of a plurality of similar notches 123 in the flange of collar 110 (more clearly shown in the detail Figure 5) so that the cross bar will turn with respect to tube 89 and by rotation thereof the drive shaft 101 will be turned. In the intermediate position,—the key 121 does not project beyond either end of the sleeve, and the cross bar or handle is free to rotate to any position desired so that it may readily be brought to a position to be locked with either the drive shaft 101 or the tube 89. The key 121 is provided with a finger piece 124 for manipulating it and a projection 125 on sleeve 106 limits its movement in one direction while a projection 126 from socket 112 limits its movement in the other direction. The key has three notches 127, corresponding to its three positions, and a detent 128 on a sliding block 129 in tube 114 is yieldingly held in engagement with any chosen one of the notches 127 by means of a spring 130 in tube 114 behind block 120 between this block and plug 116 as a retainer therefor.

The lifting head 47 may be rapidly raised or lowered to any desired position by turning the drive shaft 101 by rotating it with the handle 105 in the manner above set forth, but when it is raising or lowering a load and a greater leverage is required than is obtained in turning the handle the handle is released from the drive shaft 101 and locked to the tube 89 and then by bringing the pawl 92 into cooperation with the ratchet wheel 91 the lifting head with the load may be raised or lowered slowly with a step by step movement by oscillating the actuating lever by means of the handle up and down around its pivotal connection with frame 10. It is to be noted that during the latter operation of the handle and actuating lever the drive shaft 101 is left free to rotate in the tube 89 and with respect to the handle or cross bar 105.

Pawl 92 has a comparatively wide tooth 131 for engaging the teeth of ratchet wheel 91 and may be turned to effect either an up rotation of the wheel or a down rotation thereof according to the direction in which the tooth of the pawl faces. In order that the pawl may be turned in this manner it is formed on the end of a cylindrical body portion 132 which is rotatably and reciprocally mounted in a socket 133 extending inwardly in the casting 82 and directed toward the ratchet wheel and a spring 134 behind it is operated to urge the pawl into engagement with

the ratchet wheel. The body 132 has a reduced cylindrical extension 135 which passes through a corresponding aperture through casting 82 extending concentrically from socket 133. The outer end of the extension 135 is provided with a concentric aperture 136 for receiving the end 137 of a central rod 138 and is provided with lateral slots 139 through which a pin 140 carried by the rod end 137 projects. This pin and slot connection with the rod 138 provides means whereby the pawl may be turned for operating the ratchet wheel 91 in one direction or the other for retracting the pawl from the ratchet wheel altogether. When the pawl is arranged to engage the ratchet wheel slots 139 permit longitudinal movement of the pawl with respect to the control rod 138 as the pawl is forced backward against the spring 134 but when the control rod is drawn out far enough it will hold the pawl in a retracted position.

Mounted at an intermediate position on tube 89 is a clamp 141 comprising a collar slotted at 142 and provided with apertured lugs 143 through which a bolt 144 passes for fastening the collar in place on the tube. This clamp is provided with a downwardly extending member 145 ending in a foot 146 forming a support to keep the actuating lever 78 from striking the ground. The clamp is also provided with a side projection 147 which is apertured at 148 for receiving the control rod 138; the projection, as shown in Figures 1 and 7, is cup shaped and provided with deep upper and lower slots 149 and 150 and a shallow side slot 151 for receiving a laterally bent end 152 of the control rod 138. It will be noted that when the end 152 of the control rod is positioned in the upper slot 149 pawl 92 is positioned to engage ratchet wheel 91 in such a manner as to effect an elevation of the lifting head 47 by the swinging movement of the lever 78. When the control rod is turned with the end 152 positioned in the lower slot 150 pawl 92 is positioned to effect a lowering of the lifting head by the swinging operation of the lever and handle and when the end 152 of the rod is positioned in the side slot 151 the pawl is turned sidewise and retracted from the ratchet wheel altogether and in this position the rapid movement of the lifting head by rotating the drive shaft 101 with the handle or cross bar 105 is best effected.

In order to facilitate the positioning of the jack under a member to be lifted the jack is provided with a spotter. This includes a trip lever 153 pivotally supported at its fulcrum on an end 154 of shaft 81, the laterally extending arm 155 of the lever being provided with a pedal 156 and the upwardly extending arm 157 having an operating pin 158 for projecting a slide 159 outwardly, as best shown in Figures 8 and 9. Slide 159 rests on the upper portion of bearing 80 and

extends through a rear guide 160 secured to frame 10 by means of the bolts 12. The guide is provided with a lateral extension 161 which carries a pin 162 upon which a spring 163 is mounted so as to engage a lateral extension 164 on the slide so as to normally hold the slide in its retracted position. Pin 162 functions as a stop against which the extension 164 engages as a limit to the forward movement of the slide and its rearward movement is limited by a downward projection 165 on its front end which engages with the front of bearing 80. The forward end of slide 159 also has an upward projection 166 which is provided with a vertical slot 167 in which the operating pin 158 of the lever engages for projecting the slide outwardly and the end of the slide is formed with two steps 168 and 169 having an intermediate inclined portion 170 between them. These steps of the slide are adapted to be positioned so as to be engaged by a laterally projecting pin 171 on the casting 82 when the lever 78 is swung downwardly, but they are normally held in the retracted position by spring 163.

In the operation of the jack, when it is desired to position the lifting head 47 under a member to be raised the jack is rolled adjacent to the member and then the head may be quickly spotted thereunder by depressing pedal 156 so as to project either the lower or upper step, 168 or 169, in the path of pin 171. Lever 78 is then swung down, pin 171 engages the step and by further downward movement of the lever the rear end of the jack frame 10 is elevated so that the jack rests on the two front castor wheels 32 and the jack may be quickly swung about these two castors as a pivot to the required position. When the jack is properly positioned and allowed to rest on its rear wheels the slide 159 will still be retained in its projected position due to the weight of the lever through pin 171 resting on the step but upon raising the lever the slide is retracted immediately by spring 163. The lifting head then may be quickly elevated by connecting handle or cross bar 105 with drive shaft 101 by means of key 121 and rotating the cross bar. The key is now moved so as to lock the cross bar in a horizontal position; the end 152 of the control rod is positioned in the upper slot 149 so that pawl 92 will engage ratchet wheel 91 so as to effect an upward movement of the lifting head and the handle is then raised and lowered, swinging the lever about the shaft 81 and thus raising the lifting head with a step by step movement until the required elevation is attained. The lowering of the lifting head is effected by a similar lever operation of the lever by first positioning the end 152 of the control rod in the lower slot 150; afterwards, when the head has been relieved of its load the control rod may be positioned with its end 152 in slot 151,

a neutral or out position, and the cross bar 105 connected again by means of key 121 with drive shaft 101 and the cross bar or handle turned to lower quickly the lifting head to its lowermost or free position.

What we claim is:

1. In a lifting jack, the combination with a frame, a lifting member pivotally mounted on the frame, and a rotatable member connected with the lifting member for elevating and lowering it, of an actuating lever pivotally connected with the frame, means carried by the lever for operating the rotatable member with a step by step movement by an oscillating movement of the lever, and rotatable means carried by the lever operable to turn the rotatable member to facilitate a rapid movement of the lifting member.

2. In a lifting jack, the combination with a frame, a lifting member pivotally mounted on the frame, and a rotatable member connected with the lifting member for elevating and lowering it, of an actuating lever pivotally connected with the frame, and a pawl carried by the lever for operating the rotatable member with a step by step movement of the lever, said pawl being rotatably mounted and adapted to be positioned to drive said rotatable member in either direction to effect either an elevating or a lowering of the lifting member.

3. In a lifting jack, the combination with a frame, a lifting member pivotally mounted on the frame, and a rotatable member connected with the lifting member for elevating and lowering it, of an actuating lever pivotally connected with the frame, a pawl carried by the lever for operating the rotatable member with a step by step movement of the lever, said pawl being rotatably mounted and adapted to be positioned to drive said rotatable member in either direction to effect either an elevating or a lowering of the lifting member, means for retracting said pawl to an inoperative position, and rotatable means carried by the lever operable to turn the rotatable member to facilitate a rapid movement of the lifting member.

4. In a lifting jack, the combination with a frame and a lifting member mounted on the frame, of a two speed operating means including a lever operable to effect a slow actuation of the lifting member and means carried by the lever operable to effect a rapid actuation of the lifting member.

5. In a lifting jack, the combination with a frame, a lifting member mounted thereon, and rotatable means for raising and lowering the lifting member, of an operating lever pivotally connected with the frame, a handle on the lever for towing the jack and for actuating the lever, pawl and ratchet means associated with the lever for actuating the rotatable means for the lifting member with a step by step movement, and means for con-

necting the rotatable means with the handle to be turned thereby to effect a rapid raising or lowering of the lifting member.

6. In a lifting jack, the combination with a frame, a lifting member mounted thereon, and rotatable means for raising and lowering the lifting member, of an operating lever pivotally connected with the frame, a handle adapted to rotate on the lever and secured thereto for towing the jack, a drive shaft carried by the lever, and connections between the handle, drive shaft and rotatable means whereby the lifting member may be quickly raised or lowered by turning the handle.

7. In the combination set forth in claim 6 in which the connection between the drive shaft and rotatable means is a train of gears which permits the swinging of the lever with respect to the frame of the jack.

8. In the combination set forth in claim 6 in which the connection between the drive shaft and rotatable means is a train of gears which permits the swinging of the lever with respect to the frame of the jack, a ratchet wheel on one of the gears of the gear train, and a pawl carried by the lever adapted to engage said ratchet wheel and effect a step by step rotation of said rotatable means by swinging movement of the lever.

9. In the combination set forth in claim 6 in which the connection between the drive shaft and rotatable means is a train of gears which permits the swinging of the lever with respect to the frame of the jack, a ratchet wheel on one of the gears of the gear train, and a pawl carried by the lever adapted to engage said ratchet wheel and effect a step by step rotation of said rotatable means by swinging movement of the lever, and means for disconnecting the drive connection between the handle and said drive shaft and for connecting the handle in a horizontal position on the lever to facilitate the lever operation of the lifting member.

10. In a lifting jack, the combination with a truck frame, front and rear rollers supporting the frame, a lifting member mounted on the frame, and an actuating lever pivotally connected with the front of the frame, of means for limiting the swinging movement of the lever with respect to the frame whereby the lever may be operated to effect an elevating of the rear end of the frame to free the rear rollers and to support the jack entirely on the front rollers to facilitate spotting the lifting member under a load to be elevated thereby.

11. In a lifting jack according to claim 10, means for securing the lever at different angles with respect to the frame whereby the rear end of the frame may be raised with the lever at different elevations.

12. The combination according to claim 10 in which the means for securing the lever with respect to the frame includes a projec-

tion on the lever, a slide carried by the frame, a pedal for positioning the slide in the path of said projection, and means for normally retracting the slide to permit free swinging of the lever.

13. The combination according to claim 10 in which the means for securing the lever with respect to the frame includes a projection on the lever, a slide carried by the frame, steps on the slide adapted to be positioned in the path of said projection, a pedal for projecting the steps of the slide for engagement with said projection, and means for retracting the slide.

14. In a lifting jack, the combination with a frame, a lifting member pivotally mounted on the frame, and a rotatable member connected with the lifting member for elevating and lowering it, of an actuating lever pivotally connected with the frame, and a pawl carried by the lever for operating the rotatable member with a step by step movement of the lever, said pawl being rotatably mounted and adapted to be positioned to drive said rotatable member in either direction to effect either an elevating or a lowering of the lifting member, a drive shaft carried by the lever, a handle adapted to be connected with said drive shaft for turning it, and a train of gears connecting said drive shaft with said rotatable member.

15. In a jack including a lifting member, a roller truck consisting of front and rear end members, side bars interconnecting the end members, intermediate load members extending upwardly from said side bars for supporting the jack lifting member, load supporting bars interconnecting the upper portion of said intermediate members and each of the end members, and front and rear wheels for supporting the load transmitted thereto through said lifting member, intermediate members and load supporting bars.

16. In a lifting jack, as set forth in claim 15, a pivotal support carried by the upper portion of said intermediate members, a lifting member on said pivotal support comprising a bell crank lever having an outwardly extending lifting arm and a downwardly extending operating arm, a lifting head supported by the lifting arm, an operating nut carried by the down arm, a long screw having one end threaded through said nut and its other end rotatably supported by the front end member of the truck, and means for turning said screw for raising and lowering the lifting member.

17. In a lifting jack as set forth in claim 15, a pivotal support carried by the upper portion of said intermediate members, a lifting member on said pivotal support comprising a bell crank lever having an outwardly extending lifting arm and a downwardly extending operating arm, a lifting head pivotally supported by the lifting arm so as to tilt with re-

spect to the lever as the lever is swung on its support, and drag link bars mounted at the under side of said lever and pivotally connected with the lifting head for maintaining it in an erect position with respect to the lever at all times.

complementally, spherically shaped end engaging said socket whereby the screw may swing with relation to the support as said arm of the lifting member carrying the nut swings during the operation of the lifting member.

In testimony whereof we affix our signatures.

ROBERT E. MANLEY.

FREDERICK T. FLINCHBAUGH. 75

18. In a lifting jack as set forth in claim 15, a pivotal support carried by the upper portion of said intermediate members, a lifting member on said pivotal support comprising a bell crank lever having an outwardly extending lifting arm and a downwardly extending operating arm, a lifting head supported by the lifting arm, an operating nut carried by the down arm, a long screw having one end threaded through said nut and its other end rotatably supported by the front end member of the truck, means for turning said screw for raising and lowering the lifting member, and tensioning means interconnecting the front end members of the truck and the pivotal support for the lifting lever to counteract the thrust through the screw between the lever and the end member, including a pair of tensioning rods connected at their lower ends with said front end member, a hub on said pivotal support, a plate extending from said hub with which plate the upper ends of said rods are connected, a downwardly extending lug on said hub, a pivot carried by said lug, a pivot carried by the lifting head, and drag links connecting said last two pivots to cause said lifting head to turn with respect to its support on said lever for maintaining it in an erect position with respect to said lever at all times.

19. In a jack including a lifting member, a roller truck consisting of front and rear end castings, side bars interconnecting the end castings, intermediate load supporting castings extending upwardly from said side bars for supporting the lifting member, load supporting bars interconnecting the upper portion of said intermediate castings, a transverse shaft carried by the rear end castings, supporting wheels on said shaft, lateral bracket castings connected with the load supporting bars adjacent to the front end of the truck, and supporting wheels mounted under said brackets, whereby the load on the lifting member will be transmitted through said load supporting bars to the supporting wheels.

20. In a jack the combination with a support, a lifting member consisting of a lever pivotally mounted on said support and having a downwardly extending arm, a nut carried by said arm, a screw having its inner end extending through said nut, a bearing formed on the outer end of the screw carried by said support, means for turning the other end of the said screw in said bearing, said bearing including a socket having a spherically shaped recess through which said screw extends, and a sleeve on the screw having a

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